A STUDY ON THE METACOGNITION SKILLS AMONG THE PRIMARY SCHOOL TEACHERS IN CUDDALORE DISTRICT

BY

R. SHANMUGAM

SENIOR LECTURER,

DIET, VADALUR

CUDDALORE DISTRICT – 607303

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1.1 INTRODUCTION

Metacognition involves thinking about one's thinking, or cognition, with the goal of enhancing learning. Much of the educational theory and research surrounding metacognition is based on the work of developmental psychologist John Flavell, who applied this terminology in describing the management of information-processing activities that occur during cognitive transactions.

"Metacognition refers, among other things, to the active monitoring and consequent regulation and orchestration of these processes … usually in service of some concrete goal or objective".

“Metacognition” as a term that was coined in the 1970s and only occasionally appearing in the literature of the early 1980s, but appearing with growing frequency through the decade, becoming (with problem solving) probably the most clichéd and least understood buzz words of the 1980s.

In the field of education, metacognition is often referred to as thinking about one’s own thinking processes. Yet, metacognition also can be understood as a range of executive system processes that are intimately involved in self assessment, cognitive control, and monitoring, such as controlling the amount of time spent studying and assessing whether we understand a text. Through ongoing monitoring and control of cognition, metacognition enables us to recognize the “absence of knowledge” in a given context. Metacognitive processes depend on a complex interplay of several distinct brain regions known to be responsible for attention to task, self-awareness, memory, and even individual expectations.

Historically, metacognition has included the concept of metacognitive knowledge, recognizing that learners must have knowledge or awareness of strategies such as rehearsal, use of mnemonics, and content organization, which can all be mobilized during learning.

The concept of metacognition has been considered in recent years in field of education as a concept that is worked on. Metacognition is the awareness one has about his/ her thinking process and how he/she is able to control these processes. Metacognition strategies are the sequential process individuals use to learn how to control themselves and to reach a goal. They significantly help the arrangements and control of the individual learning. Metacognition concept was put forward for the first time in 1976 by John Flavell and developed by many researchers until today.

Metacognition plays an important role in communication, reading comprehension, language acquisition, social cognition, attention, self-control, memory, self-instruction, writing, problem solving, and personality development. Metacognitive skills are usually conceptualized as an interrelated set of competencies for learning and thinking, and include many of the skills required for active learning, critical thinking, reflective judgement, problem solving, and decision-making.

Adults whose metacognitive skills are well developed are better problem-solvers, decision makers and critical thinkers, are more able and more motivated to learn, and are more likely to be able to regulate their emotions (even in difficult situations), handle complexity, and cope with conflict. Individuals with a high level of metacognitive knowledge and skills identify blocks to learning as early as possible and change ‘tools’ or strategies to ensure goal attainment.

The person who has the awareness of metacognitive knowledge, is able to know about his/her own strengths and weakness, the nature of task at hand, and available ‘tools or skills’.

1.2 ORIGIN OF METACOGNITION

The idea of deliberate, planful and goal-directed thinking applied to one's thoughts to accomplish cognitive tasks can be traced to the developmental psychology of Jean Piaget (Inhelder and Piaget, 1958). Piaget's work, although somewhat modified in light of later advances in developmental psychology, has nevertheless had a tremendous impact on how researchers, practitioners, and the general public conceptualize child and adolescent child development (Flavell, 1963). During the 1960s and 1970s, a group of researchers extended Piaget's work to questions concerning not only how the storage and retrieval of information develops but also how it is controlled.

Over the same twenty-year period, a substantial body of work emerged that would eventually be viewed as the foundations of metacognitive research (Brown, 1978, Belmont & Butterfield, 1969, Corsini, 1971, Hagen &Kingsley, 1968, Hart 1965, and Markman, 1977). Despite the potential applications of these inquiries, the methodology of the early research was not highly sophisticated, making rigorous theories not yet available.

It was not until the 1980s that researchers in cognitive psychology collaborated with researchers in developmental psychology and educational psychology to produce more sophisticated methodologies for assessing metacognition (Cavanaugh & Perlmutter, 1982, Kluwe, 1982, Schoenfeld, 1987, and Schneider, 1985). Increased interest began in the 1990s on the topic of how people monitor their ongoing learning, and this research focused on

judgments of learning (Nelson & Dunlosky, 1991, Borkowsi & Muthukrishna, 1992, and Paris & Winograd, 1990).

While it was apparent that people who, for instance, were in self-paced learning tasks would divide their study time in ways that were not arbitrary or undirected, what was not so obvious, given the research program was not yet well developed, was the specific metacognitive mechanisms that gave rise to those differences in study times. Not until researchers sought answers to questions about both the basis for peoples judgments of learning and the accuracy of those judgments.

They were, then able to codify and integrate how students chose strategies and allocated their study time (Hacker, Dunlosky & Graesser, 1998). Once established, these methods would become especially relevant to educational situations where learners have some control over their study activities (Schunk & Zimmerman, 1994, Pressley, Harris & Guthrie, 1992, and Jones & Idol, 1990).

Admittedly, while some use of study strategies and application of prior knowledge during study probably are performed intuitively and occur without conscious regulation, a great deal of studying and academic self-management involves conscious decision making and self-regulation.

The degree to which students confront academic demands is primarily determined by how adroitly they employ various strategies. Many researchers and practitioners are now convinced that by promoting metacognitive processes during instruction, more durable and transferable learning can be achieved. "Theoreticians," in fact, "seem unanimous the most

effective learners are self-regulating" (Butler & Winne, 1995 p. 245). What is basic to the notion of metacognition is the idea of thinking about one's own thoughts.

Metacognition, more specifically, is an appreciation of what one already knows; together with a correct apprehension of the learning task and what knowledge and skills it requires, combined with the agility to make correct inferences about how to apply one's strategic knowledge to a particular situation, and to do so efficiently and reliably (Barrows, 1988, Hartman, 1990, Paris & Myers, 1981, Schoenfeld, 1987, Paris & Winograd, 1990). These are the skills that enable students to change themselves from passive learners to active learners.

1.3 DEFINITIONS OF METACOGNITION

Metacognition is a concept of cognitive psychology that “focuses on the active participation of the individual in his or her thinking process” (Stewart & Landine, 1995). A wide range of definitions and interpretations of the term metacognition have been accumulated (Manning & Payne, 1996) since it was first used by Flavell. Flavell’s (1979) expanded description included knowledge of strategy, task, and one’s own cognition. These three related kinds of metacognitive knowledge continue to be perceived as essential components of the learning process (Krathwohl, 2002; Pintrich, 2002).

Schoenfeld (1992) asserts that metacognition has multiple and almost disjoint meanings (for example, knowledge about one’s thought processes, self-regulation during problem solving) which make it difficult to use as a concept.

Hacker (1998) states that there is general agreement that the definition of metacognition should at least include the following aspects: knowledge of one’s knowledge; the conscious monitoring and regulating of one’s knowledge; and cognitive and affective states.

Metacognition is the knowledge and beliefs about cognition, in addition to the skills and strategies enabling the self-regulation of cognitive processes (De Corte, 1996, pp. 35, 36), while Papaleontiou-Louca (2003) defines metacognition as …all processes about cognition, such as sensing something about one's own thinking, thinking about one's thinking and responding to one's own thinking by monitoring and regulating it.

These various definitions of metacognition have in common the emphasis on the knowledge of cognition and the monitoring and regulation of cognitive processes. The summaries of the different facets of metacognition by Hacker (1998) and Schoenfeld (1992) contain an additional reference to the awareness and regulating of one's affective state.

1.4 METACOGNITION AND ACADEMIC PERFORMANCE

Cognitive monitoring enhances learning (Paris & Winograd; 1990). Butler and Winne (1995) assert that there is agreement among theoreticians that the most effective learners are self-regulating.

Self-regulation is viewed as synonymous to metacognitive strategies (Boekaerts & Simons, 1995).

In support Schraw (1998) states that academic performance is improved by metacognitive regulation as learners utilise resources and existing strategies better. A study conducted by Camahalan (2006) found that students' academic achievement is more likely to improve when they are given the chance to self-regulate and are explicitly taught metacognitive learning strategies.

1.5 METACOGNITIVE STRATEGIES

Metacognitive strategies refer to the conscious monitoring of one's cognitive strategies to achieve specific goals, for example when learners ask themselves questions about the work and then observe how well they answer these questions (Flavell, 1981). Boekaerts and Simons (1995) view metacognitive strategies as the decisions learners make before, during and after the process of learning.

There are various metacognitive strategies aimed at developing learners' metacognition (Costa, 1984,; Blakey & Spence, 1990; Brown, as quoted in Boekaerts & Simons, 1995,).

Planning strategy

At the start of a learning activity, teachers should make learners aware of strategies, rules and steps in problem solving. Time restrictions, goals and ground rules connected to the learning activity should be made explicit and internalised by the learners. Consequently, learners will keep them in mind during the learning activity and assess their performance against them. During the learning activity, teachers can encourage learners to share their progress, their cognitive procedures and their views of their conduct. As a result, learners will become more aware of their own behaviour and teachers will be able to identify problem areas in the learners' thinking (Costa, 1984). When learning is planned by someone else, it is difficult for learners to become self-directed (Blakey & Spence, 1990).

Generating questions

Blakey and Spence (1990) state that learners should ask themselves what they know and what they do not know at the beginning of a research activity. As the research activity

progresses, their initial statements about their knowledge of the research activity will be verified, clarified and expanded.

Ratner (1991) views the questioning of given information and assumptions as a vital aspect of intelligence: Learners should pose questions for themselves before and during the reading of learning material and pause regularly to determine whether they understand the concept; if they can link it with prior knowledge; if other examples can be given; and if they can relate the main concept to other concepts. Here Muijs and Reynolds (2005) argue that the connection of prior knowledge and new concepts should take place during the lesson and not only when a new concept is introduced. This integration of prior knowledge and new concepts enables the learner to understand the unified and interconnected nature of knowledge, while also facilitating profound understanding of subject matter (Ornstein & Hunkins, 1998).

Integration adheres to the second of the principles for quality mathematics education (NCTMP), stated by the National Council of Teachers of Mathematics (NCTM), (NCTM, 2000), namely a coherent curriculum in which students' mathematical concepts are linked and built on one another.

Choosing consciously

Teachers should guide learners to explore the results of their choices before and during the decision process. Therefore, learners will be able to recognise underlying relationships between their decisions, their actions and the results of their decisions. Non-judgmental feedback to learners about the consequences of their actions and choices promotes self-awareness (Costa, 1984), and it enables the learners to learn from their mistakes, thereby

supporting the fourth principle of the NCTMP of "learning… understanding, actively building new knowledge from experience…" (NCTM, 2000).

Setting and pursuing goals

Artzt and Armour-Thomas (1998) define goals as "expectations about the intellectual, social and emotional outcomes for students as a consequence of their classroom experiences". These goals support the first principle of the NCTMP of high expectations and support for learners. Learners who are self regulating strive to attain a self-formulated goal while self-regulated behaviour can be adapted with changing circumstances (Diaz, Neal, & Amaya-Williams, 1990)

Evaluating the way of thinking and acting

Metacognition can be enhanced if teachers guide learners to evaluate the learning activity according to at least two sets of criteria (Costa, 1984). Initially, evaluative criteria could be jointly developed with the learners to support them in assessing their own thinking. As an example, learners could be asked to assess the learning activity by stating helpful and hindering aspects and their likes and dislikes of the learning activity. Accordingly, learners keep the criteria in mind when classifying their opinions about the learning activity and they motivate the reasons for those opinions (Costa, 1984). Guided self-evaluation can be introduced by checklists focusing on thinking processes and self-evaluation will increasingly be applied more independently (Blakey & Spence, 1990).

Identifying the difficulty

Costa (1984) advises teachers to discourage the use of phrases like “I can’t”; “I am too slow to…”; or “I don’t know how to…”. Rather, learners should identify the resources, skills and information required to attain the learning outcome. As a result, learners are assisted to distinguish between their current knowledge and the knowledge they need. They also have more conviction in seeking the right strategy for solving the problem.

Paraphrasing, elaborating and reflecting learners’ ideas

Teachers should support learners to restate, translate, compare and paraphrase other learners’ ideas. Consequently, learners will be better listeners to other learners’ thinking and also to their own thinking (Costa, 1984). The teacher can, for example, respond: “What you are explaining to us is…”; “I understand that you are suggesting the following…”

Carpenter and Lehrer (1999) assert that the ability to articulate one’s ideas requires profound understanding of significant aspects and concepts. They view the ability to reflect as a prerequisite for articulation and that articulation requires the identification of the essence and critical elements of an activity.

Clarifying learners’ terminology

Learners regularly use vague terminology when making value judgments, for example “The question is not fair” or “The question is too difficult”. Teachers should elucidate these value judgments, for example “Why is the question not fair?” or “Why is the question too difficult?” (Costa, 1984).

Problem-solving activities

In problem solving, existing knowledge is applied to an unfamiliar situation to gain new knowledge (Killen, 2000). Problem-solving activities are ideal opportunities to enhance metacognitive strategies, as good problem solvers are generally self-aware thinkers. Learners with superior metacognitive abilities are better problem solvers. The ability to analyse their problem-solving strategies and reflect on their thinking reveals the learners' metacognitive skills (Blakey & Spence, 1990; Panaoura, Philippou, & Christou, 2003).

After the problem-solving process, teachers should encourage learners to clarify their course of action, instead of merely correcting the learner (Costa, 1984). Goos & Galbraith (1996) state that non-cognitive aspects, like learners debilitating beliefs about the nature of mathematics and about themselves, could have a positive or negative effect on cognitive and metacognitive processes involved in problem solving.

When the whole class works on a problem, the teacher, instead of steering the learners to the answer, helps the learners to take full advantage of those aspects that they have produced. During this process of guiding the learners, the teacher will ask questions like: "Are you all convinced that you understand the problem?"; and "Which of the suggestions to solve the problem should we attempt first, and why?". After the class has worked on the problem for about five minutes, the teacher could ask them whether the process is going well, and if not, to reassess the strategy. If the class decides to reject that strategy, the teacher could ask whether anything helpful could be recovered from their effort.

When a solution is reached, the teacher reviews the whole problem-solving process and indicates where the class went wrong initially. Teachers also lead the class in finding alternative solutions to the problem (Schoenfeld, 1987). In this regard, Muijs and Reynolds (2005) list

reflection as one of the elements of constructivist teaching strategies. They describe reflection, a key learning moment, as the comparing of solutions between learners. They also regard reflection as the process learners engage in when they think about problem-solving strategies and their effectiveness.

Schoenfeld (1987) considers whole class problem solving as promoting self-regulation, because the teacher's role as a moderator compels learners to focus on control decisions made by themselves, and not by the teacher. Another aspect of whole class problem solving that Schoenfeld (1987) discusses is the opportunity it affords to pose problems that evoke beliefs about mathematics. An example is mentioned of the belief that problems can be solved relatively quickly if the subject matter is well understood. To challenge this belief, a problem is assigned that would probably take the class a few days, or even weeks, to solve.

Schoenfeld's (1987) aim with small group problem solving is to provide learners with a range of problem-solving strategies (heuristics), and then to train them to use those strategies effectively. When learners are only taught about heuristics and then have to work on problems at home, the teacher is not present in the midst of problem solving when his/her input could have promoted the use of self-regulation skills, for example, the teacher informs the learners that they are going to be asked the following three questions whenever they work on a problem: "What exactly are you doing?"; "Why are you doing it?"; and "How does it help you?". Gradually, it becomes a matter of practice for the learners to start asking the questions themselves, thereby improving their problem-solving skills and operation on a metacognitive level.

Thinking aloud

Teachers should promote the habit of thinking aloud when learners solve problems (Costa, 1984). Talking about their thinking will help learners to identify their thinking skills (Blakey & Spence, 1990).

Muijs and Reynolds (2005) use the term "articulation" to describe learners' expression of their own thoughts and ideas. They recommend that learners should discuss complex tasks and present their ideas to fellow learners. They furthermore suggest that group work could be very effective in promoting articulation. In this regard, Blakey and Spence (1990) mention paired problem solving, where one learner describes his/her thinking processes while his/her partner helps him/her to clarify his thinking by listening and asking questions.

A main aspect of Vygotsky's developmental theory is that children start using language not only to communicate, but also to regulate their activities by guiding, planning and monitoring (Diaz et al., 1990,). Three consequences for self-regulation through the use of language can be identified. Firstly, children organise and restructure their perceptions in terms of their goals. Secondly, children's actions are less impulsive as they allow them to act reflectively according to their goals.

Finally, language not only enables children to regulate their way of perceiving stimuli, but also to regulate their behaviour (Diaz Et al. 1990). Camp, Blom, Hebert and van Doornick, (1977) developed a program called Think Aloud to improve self-control. Children are taught to use the following four questions when solving problems: "What is my problem?"; "How can I do it?"; "Am I using my plan?"; and "How did I *do"*?

Journal-keeping

Keeping a personal diary throughout a learning experience facilitates the creation and expression of thoughts and actions. Learners make notes of ambiguities, inconsistencies, mistakes, insights, and ways to correct their mistakes. Preliminary insights can be compared with changes in those insights as more information is gathered or obtained through feedback from assessment, thereby supporting the fifth principle of the NCTMP, namely, that assessment should support the learning of mathematics (Costa,1984; Blakey & Spence, 1990; NCTM, 2000).

Cooperative learning

Cooperative learning creates the opportunity for learners to work together in small groups to enhance learning. It entails more than group work, as group work is considered as a modification of whole-class discussion. In cooperative learning, the teacher gives indirect guidance as the group works together to achieve specific learning outcomes (Killen, 2000). Cooperative learning may promote awareness of learners' personal thinking and of others' thinking. When learners act as "tutors", the process of planning what they are going to teach, lead to independent learning and clarifying the learning material (Blakey & Spence, 1990).

Modelling

The NCTM lists effective teaching as a third principle of the NCTMP (NCTM, p. 2000). Modelling occurs when teachers demonstrate the processes involved in performing a difficult task, or when teachers tell learners about their thinking and the motivation for selecting certain strategies when solving problems (Muijs & Reynolds, 2005). Modelling and discussion enhance learners' thinking and talking about their own thinking (Blakey & Spence, 1990).

Schoenfeld (1987) refers to the importance for teachers of not always presenting the finished, neat presentation of the answers on the board, but to sometimes model the problems and working through the problem step by step. Consequently, the processes yielding the correct answer (for example false starts, recoveries from false starts and interesting insights) are exposed and the chief purpose of the modelling approach is achieved, namely the centering of learners' awareness on metacognitive behaviours**.**

Costa (1984) suggests that modelling could be the most effective strategy used to enhance metacognition among learners because they learn best by imitating adults. Teachers will, by thinking aloud throughout planning and problem-solving activities, demonstrate their thinking processes.

Teachers, therefore, have a great responsibility because "a fair proportion of the learning problems in mathematics are actually taught to the children…" (Moodley, 1992). Van der Walt and Maree (2007) found that mathematics teachers employed question-posing strategies and think-aloud models, but that they did not sufficiently promote the implementation and practice of these strategies among learners.

Aspects that denote teachers' modelling behaviour include explaining their planning, goals and objectives to the learners and motivating their actions; acknowledging their temporary inability to answer a question, but developing pathways for finding the answer; making human mistakes, but demonstrating how to correct those mistakes; requesting comments and assessment of their actions; acting in accordance with an explicitly stated value system; the ability to explain what their strengths and weaknesses are; and expressing an understanding and valuing of learners' ideas and feelings (Costa, 1984). Regarding the expression of understanding and the valuing of learners' ideas and feelings, Muijs and Reynolds (2005) state that flexibility, an element of the constructivist teaching strategies, is the

process whereby learners partly guide the progress of the lesson as teachers interact with learners.

Vygotsky's developmental theory proposes that the development of self-regulation originates and is enhanced by the teacher-learner social interactions (Diaz et al., 1990). Diaz et al. (1990) identify three characteristics of teacher-learner interactions that promote self-regulation, namely the use of reasoning and supplying reasons for commands; the gradual withdrawal of teacher control; and the combination of the previous two aspects in an atmosphere of emotional warmth and affective nurturance. De Abreu, Bishop and Pompeu (1997) also stress the importance of affect in arguing that, although learners experience mathematics cognitively and affectively, they only have the opportunity to express the cognitive aspect.

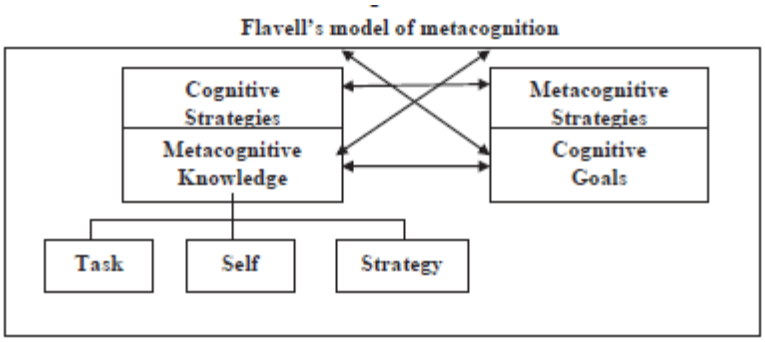
1.6 MODELS OF METACOGNITION

Flavell's model of metacognition

A number of models have been proposed from different conceptualizations of metacognition. Some are more general and provide a theoretical framework for metacognition. The models proposed by Flavell (1976) and Brown (1978) explain metacognitive knowledge and metacognitive experience especially well.

Metacognitive experience refers to executive processes such as awareness, control and evaluation. The models by Flavell and Brown can be used as good guides for readers to understand and conceptualize the components of metacognition.

In his work, Flavell (1976) proposed that our metacognitive knowledge base consists of what we have learned, through experience, about cognitive activities. He further mentioned that it could be subdivided into three highly interactive knowledge variables personal variables, task variables, and strategy variables. Flavell suggested that a strong metacognitive knowledge base is critical to successful learning and a good learner is one who has metacognitive knowledge about the self as learner, about the nature of the cognitive task at hand, and about appropriate strategies for achieving academic goals. Figure I.3 explains the components of metacognition as stated by Flavell.



Brown's model of metacognition

Brown (1987) divides metacognition into two broad categories. The first category is related to knowledge of cognition which involves the reflection of cognitive abilities and activities. This involves the conscious reflection of cognitive activities during the

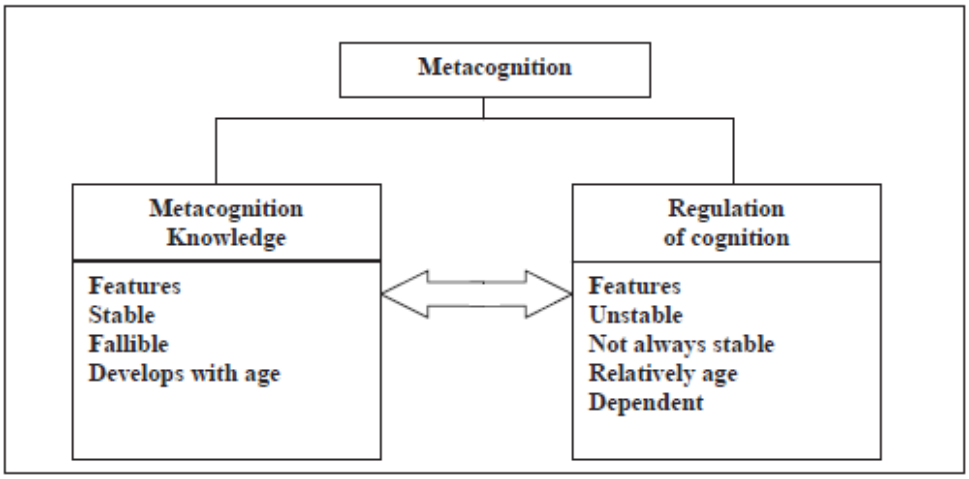
accomplishment of a task. The second component of metacognition is related to self regulatory mechanisms employed during an on going attempt to learn or solve problems.

This mechanism is defined by Brown as the regulation of cognition. According to Brown, the knowledge of cognition and the regulation of cognition are closely related to each other. The knowledge about cognition is stable, fallible and often late developing in human thinkers and learners.

In the beginning, metacognition was considered to be ‘knowing about knowing’ (Brown 1987). Whereas, regulation of cognition consisted of activities used to regulate and control learning activities, monitoring activities and evaluating activities.

Brown feels that expert learners are normally equipped with a high degree of metacognitive awareness and are able to monitor and evaluate their learning activities strategically.

Brown’s model of metacogniton



1.7 TECHNIQUES TO ENHANCE METACOGNITIVE SKILLS

What follows are a number of techniques that may help trainees enhance metacognitive skills and by extension their ability to meet competencies, such as practice-based learning and improvement. Examples of techniques include, but are not limited to, reflection, use of graphic organizers, feedback, use of think-aloud strategies, prediction of outcomes, cognitive debiasing and forcing strategies, and questioning techniques.

Reflection

Faculty can guide learners to reflect on past experiences before feedback sessions, noting whether outcomes met their own objectives for an assignment or encounter. For example, faculty may ask a learner to describe a patient interaction in which bad news was delivered and reflect on their performance during the interaction. Learners also can be asked to focus on actions they might have taken to produce a different outcome. How could they have been more successful? It is helpful for the reflection process to be modeled for learners who are not comfortable with reflective thinking. Mamede Et al describe the use of reflection to counter the tendency of first- and second-year residents to engage in cognitive errors such as the tendency to settle on a diagnosis on the basis of how easily it was recalled.

Incorporating reflective practice need not entail a major revision of the curriculum. Reflection is routinely used during debriefing of simulation scenarios. It can also be incorporated into curricula during conferences, such as morbidity and mortality sessions, where residents can be asked to reflect on the case presented and identify potential system failures.

Use of graphic organizers

Graphic organizers, which allow for visual representations of information and processes, have been found to enhance knowledge acquisition and retention. Concept maps, one type of graphic organizer, can aid faculty in clarifying concepts for learners. See West et al for a visual depiction of a concept map, which is typically used to organize information. In some situations, graphic organizers may provide the needed visual depiction of a process and its outcome(s), critical for learner understanding. Graphic organizers also can be used to provide overall directions, plans of action, and feedback, thereby functioning as metacognitive scaffolds.

Feedback

As learners often have significant deficits in the capacity to engage in unguided self assessments of the past performance, it is critical for learners to obtain outside, independent feedback from credible sources. Both modifying and reinforcing feedback are important for performance improvement. Although immediate feedback is typically recommended for most learners, Archer noted that for many high achievers, delayed feedback is often more efficacious than interrupting a task to give a learner immediate feedback.

Think-aloud strategies

Modelling is a frequently used technique in healthcare education to teach learners at all levels. By adding a think-aloud component, faculty can share their own reasoning processes, including how they arrived at certain decisions and how they solve a diagnostic problem.

In clinical settings, faculty can articulate how they think through a case to allow students or residents to gain perspective on identified outcomes. Lajoie emphasized the value of measures that help learners understand how experts think. Faculty think alouds can serve as

a scaffold for learners: Explicit modeling fades as students acquire new knowledge and skills. Faculty members have also successfully used the concept of learner think-alouds to better assess clinical reasoning skills in their trainees. Think-aloud strategies, if practiced by faculty before the clinical encounter, should not add unduly to clinical time.

Cognitive debiasing and forcing strategies

In an effort to reduce overconfidence and minimize resulting cognitive biases, learners can be asked to generate counterfactual or disconfirming evidence that supports different conclusions or hypotheses. For example, at Scott & White/Texas A&M Health Science Centre College of Medicine, pulmonary fellows are queried during informal, small group case presentations and are asked to provide all relevant data while considering disconfirming and confirmatory evidence. Fellows are encouraged to participate in the discussion as the group unpacks the differential diagnosis and reflects on whether or not premature closure has occurred in the decision-making process. As mentioned earlier, reflection also has been used as a cognitive debiasing strategy, with good results.

1.8 NEED FOR THE STUDY

The effectiveness of education system depends on the effectiveness of its teachers. Most of the classroom teaching in India continues to be teacher dominated hence we should pay more attention towards teacher effectiveness so that the future generation are to be adequately prepared to face the changing time. For this purpose, there must be a sound theory at the bottom of teacher effectiveness. Secondary school teachers occupy a place of crucial importance.

The future of the country inevitably rests on them. It is prominent for them to earn public recognition by their enlightened devoting and professional efficiency. Higher standards

of efficiency and integrity may themselves contribute to their status. Therefor**e,** the present study was conducted on secondary school teachers.

Through this study the investigator wants to examine teacher effectiveness in relation to meta-cognitive strategy. The effect of background variables namely gender, locality, nature of school, teaching experience, educational qualification, results and generation of learners over the research variable namely: metacognition

1.9 STATEMENT OF PROBLEM

The present investigation is **"METACOGNITIVE AMONG PRIMARY SCHOOL TEACHERS IN CUDDALORE DISTRICT"**

1.10 SIGNIFICANCE OF PROBLEM

Metacognition skills helps in the understanding of one's regulation and use of knowledge namely: declarative knowledge, procedural knowledge, conditional knowledge and knowledge about cognition. Thus the use of the appropriate type of knowledge namely declarative, procedural, conditional and knowledge about cognition helps for a teacher while working in school and while engaged in varied teaching activities. As teaching involves in the knowledge imparting and hence the knowledge about cognition helps teachers much in handling knowledge.

The component namely: Regulation of Cognition helps a teacher while performing various tasks. The sub-components of regulation of cognition namely: planning, information

management strategy, Comprehension Monitoring, Debugging Strategy, Evaluation and regulation of cognition. These components aid the teachers in working situation.

1.11 OPERATIONAL DEFINITION OF VARIABLES

Following are the variables employed in this study:

Research variable

Metacognitive skills: It refers to teachers' understanding of one's self preferably in teaching and learning. It is the score obtained by teachers' in metacognitive scale.

1.12 OBJECTIVES OF STUDY

The following are the objectives of the study:

Primary objectives

1. To study the metacognitive skills among primary school teachers in Cuddalore district.

Secondary objectives

2. To study the differences in metacognitive skills among primary school teachers in Cuddalore district with respect to the following personal variables

    1. Gender

2. Locality
3. Nature of school
4. Teaching experience
5. Educational qualification
6. Results given
7. Generation of learners

1.13 DELIMITATIONS OF STUDY

Following are the delimitations of the present study:

1. The study sample is limited to only primary school teachers.
2. The study utilizes sample only from Cuddalore district.

1.14 BRIEF RESUME OF SUCCEEDING CHAPTER

Chapter- I deal with conceptual framework of the problem.

Chapter- II gives a survey of related literature.

Chapter-III provides the methods and procedure followed by the investigator.

Chapter- IV explains about the analysis and interpretation.

Chapter- V gives a summary of findings, conclusions and recommendations of the study.

CHAPTER- II

REVIEW OF RELATED LITERATURE

2.1 INTRODUCTION

A survey of background literature pertinent to the subject of investigation is an essential stage in the research study. The research worker needs for any worthwhile study in any field of knowledge, an adequate familiarity with library and its resources. The search for reference material may be time consuming but a very fruitful phase of the research programme. Researcher needs to acquire up-to-date information about what has been thought and done in a particular area from which he intends to take up problem for research. Survey of literature is as crucial as planning of the study and time spent in such a survey invariably is a wise investment. It gives knowledge of the previous studies undertaken, the latest trend in the field of present investigation, the missing gaps and gives scope for the future investigation.

The major purpose of reviewing the literature is to determine what has already done to the research topic under investigation. This knowledge not only avoids unintentional duplication, but also provides the understanding and insights necessary to develop a logical framework into which the research topic fits. According to Reguram Singh (1972) “the review of the related literature promotes a greater understanding of the problem and its crucial aspects and ensures the avoidance of unnecessary duplication”. Another important function of the review of the literature is to point out research strategies, specific procedures and measuring instruments that have been found to be productive in investigating body of research.

2.2 STUDIES CONDUCTED IN INDIA

Suruchi Sahoo. Et.Al., (2021) conducted a study on "Metacognitive Awareness on Teaching and Teaching Competence of Secondary Prospective Teachers". Metacognition is the individual's awareness of how he learns and what he does, employment of proper knowledge to gain his ends; the ability to employ cognitive skills that are required in an ordinary test, the knowledge of which strategies be employed with which goals, and the assessment of individual processes before and after the performance" (Flavell, 1997). Here, an attempt was made to investigate the relationship and differences of metacognitive awareness on teaching and teaching competence of prospective secondary teachers.

The main objective of the study was to compare the significant mean differences and relationship of of metacognitive awareness on teaching and teaching competence of male and female secondary prospective teachers. A sample of 100 secondary prospective teachers consisted of 50 males and 50 females from Dr. PMIASE, Sambalpur, and Panchayat College, Bargarh, were selected randomly. For this study, both correlational and causal-comparative method was employed by the researcher.

To collect data, the researcher used the Inventory of Metacognitive Awareness for Teachers (MAIT) developed by C. Balcikanli (2011) and the General teaching Competence scale (GTC) developed by B.K. Passi and Lalitha (1994). The obtained data were analyzed using"t" test and Pearson correlation coefficient "r." It was that found the mean scores of male teachers are significantly better than the female teachers when metacognitive awareness was compared with teaching and teaching competence. Lastly, the result indicated there existed a strong positive correlation of metacognitive awareness on teaching and teaching competency concerning male and female student teachers.

R. Periasamy. (2021) conducted a study on "Metacognition among the School Teachers". The metacognition is a process that enables learners to take control of their own cognition, emotion and motivation. It includes knowledge of cognition and regulation of cognition. The descriptive survey method with simple random sampling technique has used in this study. The sample consists of three hundred teachers from ten high schools and twenty higher secondary schools in Thanjavur districts of Tamilnadu.

The data were collected by using the Metacognition Awareness Inventory (MAI) developed by the investigator. The present study concludes that there is a significant difference in the mean scores of metacognition among the groups of the school teachers with respect to school natures. Hence, all the teachers must develop their skills to meet student's educational needs during the B.Ed. training period and in-service training.

Mandal, Udayan. (2019) conducted a study on "Meta cognitive awareness in relation to teacher competencies as perceived by students". Now-a-days, students are considered the central part of education system. This idea was newline propagated by Rousseau. Modern education system demand child need, motivation, interest, newline attitude, aptitude and thinking skills. Being the age of child centric education the role of a teacher newline is not end rather increased a great. Without the concept of teacher, teaching - learning process is newline not possible successfully. Teacher is the greater factor of entire education system and upon him newline teaching- learning process depends. Hence, the Kothari Commission (1964-66) aptly mentioned newline that of all the different factors which influence the quality of education and its contribution to newline nation development, the quality, competence and character of teacher are undoubtedly the most newline significant. Actually,

it is very true that there is a significant relationship between teacher and newline competencies and student and achievements.

Jesintha Princy J. (2017) conducted a study on "Analyzing the Role Of Metacognition In M-Learning". Mobile devices have eventually become a part of university students. Smart phones and tablets are not only used for social networking, informal reading and other entertainments. These gadgets have become the device of educators and researchers who have found the potential in using these technologies, merging into the mainstream of education.

Applied to second language learning metacognitive knowledge refers to the general assumptions that learners hold about themselves on factors influencing language learning, about the nature of language learning and teaching. By analyzing the role metacognitive in M-Learning the real need and the cognitive influence of the learners can be studied. This study will help in the enhancement of mobile app to a level where the learner learn to exercise their autonomy in language learning through self-recognition of in build abilities.

Poonam Sharma & Nisha Mishra. (2017) discusses on "Meta Cognitive Environment: Need Of 21st century". Although thinking is innate, skillful thinking must be cultivated." (Art Costa) The structures and functionality of our society is rapidly changing with the development of technology and we find that in today's context many skills and values of the past are no longer relevant. The students of our society must be prepared for accepting the challenges of multidimensional domains.

It is the primary job of the educator to ensure that the art of thinking is being valued, encouraged, and challenged in the classroom.

The ability of interpersonal and intrapersonal management of learning tasks involves a constant process of self-evaluation and modification in both the cognitive process and learning outcomes. So It is the utmost demand of the 21st century workforce to produce innovative, motivated, technically skilled critical thinkers who can both recognize problems and find solutions and give further suggestions along with educational implications.

The ability to think about one's thinking is what neuroscientists call metacognition. Metacognition is the process of thinking that represents productive thoughts of the convergent, divergent and evaluative thinking. It may be defined as having knowledge of one's own different intellectual operations. Strategies are the techniques employed to foster development of learning skills. Both traditional metacognitive strategies and those that have been developed and researched lays emphasis on offering different ways of helping students to use technology based on metacognition as a learning tool.

It is important to remember that each student has unique creative intelligence thus, every effort should be grasped to select and adapt strategies to each individual's abilities, learning styles, and learning preference. In this rapidly changing world, the challenge of teaching is to help students develop those skills and values that will not become obsolete in future. For centuries we have been conditioned by nationality, caste, class, tradition, religion, language etc. and every influence we can think of and therefore our responses to every problem are conditioned. A metacognitive environment

inculcate higher order thinking skills to emphasize critical thinking in removing the influences of responses that are already conditioned.

Planning and organizing of metacognitive skills must be shared between teachers and students so that metacognitive environment could be created. In the metacognitive environment teachers monitor and apply their knowledge and deliberately modeling metacognitive behavior to assist students in becoming aware of their own thinking.

Use of Metacognitive strategies in teaching learning process is essential for the twenty first century because these strategies may enable the students to cope successfully with new challenges of the modern world. This study assumes greater significance of using metacognitive skills in achieving constructive learning.

Rois Amrullah Akbar.(2017) conducted a study on "Empowering Metacognition Skill by RDSE (Reading, Discussing, Searching, and Experimenting) Learning Model". Based on the needs analysis conducted in Banyuwangi district, metacognition skills are less empowered by students in learning. One of learning model combined and potentially empowering metacognition skills is the RDSE learning model (Reading, Discussing, Searching, and Experimenting). The purpose of this research is to know the effectiveness of RDSE learning model on metacognition skills.

The RDSE learning model consists of four stages: 1) Reading, 2) Discussing, 3) Searching, and 4)Experimenting is expected to empower metacognition skills. The population of this study was the

tenth grade students of State Senior High School Muncar Banyuwangi in the 2016/2017 academic year. The metacognition skill was measured through metacognitive awareness inventory (MAI). Data analysis was used quantitative descriptive. The data were analyzed by using Normalized gain (g). The results show that RDSE learning model can empowering metacognition skill. The effective RDSE learning model empowering metacognition skills value Normalized gain (g) 0,72 (high).

Rishi Kumar & Gurkirat Kaur. (2016) conducted a study on "Effect of metacognition integrated multimedia learning package (MIMLP) on the academic achievement of rural and urban B.Ed. trainee teachers.

This study was conducted on 100 rural and urban B.Ed. trainee teachers to find out the influence of Metacognition. Integrated Multimedia Learning Multimedia Package (MIMLP) on the Academic Achievement. The investigator hypothesized that the achievement in Educational Psychology of B.Ed. trainees taught using Metacognition Integrated Multimedia Learning Package (MILP) will significantly be higher than that of those who will be taught through the Present Method of Teaching. The results showed that there is a significant mean difference in the achievement between the rural and urban students of B.Ed.

Beena Sajeev and M. Vani. (2015) conducted a study on "A Correlational Study of Meta-Cognition, Emotional Competence and scholastic achievement of XIth Grade Students". The study was undertaken to investigate the relationship of meta-cognition, emotional competence and scholastic achievement of XI grade students. A sample of 600 students studying in XI grade was raised from

different senior secondary schools. Meta-Cognition Inventory (MCI) prepared by Dr. Punita Govil (Chandausi) published by National Psychological Corporation in 2003. Emotional Competence scale (ECS-BS) made by R. Bharadwaj and H. Sharma published by National Psychological Corporation was used by the researchers.

For Scholastic achievement Class- X board examination result of XI grade students was considered. The results show that there is a significant relationship between meta-cognition and scholastic achievement; as well as between emotional competence and scholastic achievement of senior secondary students.

Surekha Soni. (2015) conducted a study on "Personality Traits Of Metacognitive Functioning Among Teacher Trainees". Metacognition is one of the most actively investigated cognitive processes in contemporary research in developmental and instructional psychology.

Metacognition is a form of cognition, a second or higher order thinking process which involves active control over cognitive processes. It could also be defined as thinking about thinking or as a "person's cognition about cognition". Metacognition is related to different disciplines cognitive psychology, developmental psychology and philosophy of mind etc. So this topic as a research spreads a wide umbrella of several research problems needs to be investigated. So as a scholar of education and a teaching faculty. They found this subject area very wide and crucial in terms of analyzing the effect of Metacognition and related traits on the personality and decision making of a teacher trainee.

Geeta Shetty. (2014) conducted a study on "A Study of the Metacognition Levels of Student Teachers On The Basis Of Their Learning Styles". Metacognition and Learning styles are significant factors that influence learning. Metacognition is the awareness of one's own patterns of thinking. Metacognitive awareness helps a learner to be self directed and self regulated. Learners exhibit different learning styles that influence the way they make sense of the learning experiences. The study aimed at finding out the learning styles that showed higher levels of Metacognition.

The Descriptive Survey Method was adopted for the study. A sample of 172 student teachers were administered the Metacognitive Awareness Inventory (Schraw and Dennison-1994) and The Myers-Briggs Type Indicator (MBTI -1977). The data collected was analyzed using the't – test' to compare the Mean scores on Metacognition of student teachers having different learning styles. The results showed that the combination that emerged the highest among student teachers was ESFJ (Extraversion, Sensing, Feeling and Judging). However student teachers with the learning styles Introversion and Thinking were found to be significantly higher in Metacognition as compared to student teachers with the learning styles Extraversion and Feeling.

Sri Haryani. (2012) conducted a study on "Developing Metacognition of Teacher Candidates by Implementing Problem Based Learning within the Area of Analytical Chemistry". This research is intended to improve chemistry teacher candidates' metacognition and mastery over the concept of spectrometry and electrometry by implementing Problem Based Learning strategy. Quasi-experimental method along with pretest –posttest controlled group was employed in Laboratory practices of Analytical Chemistry Instrument Class. The assessment of metacognition was undertaken

through content-based descriptive written test, questionnaire, and interview; and that of the mastery was undertaken only through descriptive text.

The result of the research shows that %N-gain of descriptive test of metacognition and concept mastery from experimental group is higher than that of controlled group. The result of questionnaire and interview also supports metacognitive development of experimental class, with the highest metacognitive indicator achieved in identifying information and the lowest in developing procedure.

The development of metacognition followed by the mastery of concept or vice versa can be much higher if the contributor is committed to constant innovation in changing the paradigm of verification-based laboratory practices to open-ended laboratory practices, and optimizing guiding process with more solid and consistent contributing team in every stage of problem based learning implementation.

2.3 STUDIES CONDUCTED IN ABROAD

Calogero Iacolino. (2023) conducted a study on **"**The Role of Emotional Intelligence and Metacognition in Teachers' Stress during Pandemic Remote Working: A Moderated Mediation Model". During the COVID-19 pandemic, in adapting to social and work changes and new technological methods for remote teaching, teachers were subjected to increased work pressure, which affected their well-being and led to increased negative stress and burnout. This study was designed to test

whether dysfunctional outcomes resulting from adapting to new ways of teaching via technological tools can be mitigated by the protective factors of emotional intelligence and metacognition.

The study involved 604 teachers in Sicily filling out a questionnaire consisting of four different scales: (1) the Schutte Self-Report Emotional Intelligence Test (SREIT); (2) the Metacognitive Functions Screening Scale (MFSS-30); (3) the Link Burnout Questionnaire (LBQ); and (4) the Secondary Traumatic Stress Scale STSS-I. The results show that emotional intelligence mediates the relationship between certain remote work risk factors, as well as stress and burnout. In addition, metacognition was found to be a significant moderating factor in the relationship between risk factors and emotional intelligence. With regard to the United Nations' Agenda 2030 Goals, our results emphasize the importance of teachers' emotional and metacognitive skills in promoting quality of life and psychological well-being.

Maria Sofologi. Et.Al., (2023) conducted a study on "The Effect of Secondary Education Teachers' Metacognitive Knowledge and Professional Development on Their Tacit Knowledge Strategies". The present study investigated the pattern of relations among the tacit knowledge of high school teachers, their professional development, and their metacognitive knowledge concerning their teaching practices.

Two hundred and seventy-nine secondary school teachers of both sexes, between the ages of 30 and 59 years, with teaching experience of between 1 and 19 years, participated in the study. Teachers' tacit knowledge was evaluated through the hypothetical scenarios of the Tacit Knowledge Inventory for High School Teachers (TKI-HS), which has been developed for the estimation of teachers' practical strategies.

For the evaluation of teachers' metacognitive knowledge and professional development, self-report questionnaires were administered to the participants. Path analysis indicated relationships between teachers' metacognitive knowledge regarding difficulties in classroom management and in the use of modern methods and technologies on the one hand, and the use of certain tacit knowledge strategies on the other. In addition, teachers' professional development, especially their ability to interact in socially heterogeneous groups, was also found to have an effect on their tacit knowledge strategies.

Tajularipin Sulaiman. Et.al., (2021) conducted a study on **"**Primary Science Teachers' Perspectives about Metacognition in Science Teaching". Metacognition in science teaching involves processes that include self-awareness and self-regulation.

Metacognition enables the teachers to facilitate student learning and to reflect on their teaching in order to enable themselves to improve or to make any changes to their teaching. In particular, teaching activities, especially in the 21st century, do not merely involve the transfer of knowledge and then applying that knowledge into daily life, but teachers need to reflect, plan and evaluate learning outcomes to enhance further in teaching. This study attempts to gain the perspective and implementation of metacognition skills in teaching science in the primary school classroom.

The data was collected through a qualitative research method based on interviews with six science teachers in primary school using semi-structured interview protocol. The interview data were

analysed for emerging themes, guided by the research questions. Teachers have a similar perspective of the understanding of metacognition in science teaching.

Further discussion focuses on the implementation of metacognition in science teaching. This discussion is divided into three aspects, which are constraints faced, overcoming the constraints, and efforts made to implement metacognition in science teaching. Hence, the understanding of science teachers in regards to metacognition in science teaching is important and gives a positive impact towards teaching and learning in primary science teaching.

Suhamira Nordin and Kamariah Yunus. (2020) conducted a study "Exploring Metacognitive Awareness among Teachers". Teaching with metacognition is one of the neglected areas in school policy and practice. Accordingly, educating metacognitive individuals has become an imperative concern in the development of growth of autonomous learners; one who thinks, acts, takes a stand, and works on judgement based on reasons. In the current research, metacognition is given a functional role which helps English primary school teachers to describe higher order thinking skills that are being practiced in the teaching of reading comprehension strategy.

A search of the literature revealed that past studies only focused on the challenges faced by teachers concerning their higher order thinking skills which repetitively addressed the lack of knowledge and skills among teachers. The present paper aims to explore the empirical research on the role of metacognitive awareness reading strategies that are involved in the representation of integrated HOTS in the reading lesson.

In the case of the present study, the findings from metacognitive studies among teachers were discussed by highlighting the focus of this paper. More importantly, the current review further expanded the understanding on the knowledge of metacognition, knowledge of regulation, and sense of judgment in metacognitive experiences among teachers in reading strategies instruction, thus further indicating the ESL learning strategies that should be implied to all learners. Finally, a recommendation for future studies is highlighted at the end of this paper by discussing the limitation of previous studies.

Jie Zheng. (2017) conducted a study on "Application of Metacognitive Strategy to Primary Listening Teaching. It is of vital importance that our students should be taught to listen effectively and critically. This essay focuses the metacognitive strategy in listening and an empirical study of the application of metacognitive strategy to primary listening teaching is made.

Barbara J. Millis. (2016) conducted a study on "Using Metacognition to Promote Learning". Metacognition has increasingly been recognized as essential for learning. This paper defines metacognition, discusses its importance, and specifies how faculty can nurture it in students to promote positive learning outcomes. The paper then offers extensive examples based on two formats: (1) activities offered before, during, and after lessons or as ongoing assignments in an online course; and (2) quizzes and examinations (tests), whether multiple choice or essay, that can be analyzed for maximizing future performance.

Loredana Manasia. (2015) conducted a study on **"**Creating a-ha moments in teaching practice. Routine versus adaptive metacognitive behaviors in teachers". This paper focuses on adaptive metacognition research in Romanian teachers in upper secondary education. The article

describes the results of a hybrid quasi-experimental research study conducted on high school teachers. The research was conducted in three phases: profiling teachers regarding their level of metacognitive competence, involving teachers in metacognitive training activities, and investigating the changes in teachers' adaptive behavior.

The initial sample of teachers was divided into two groups, namely the control and treatment group. The subjects in treatment condition were engaged in a metacognitive approach based on erotetic techniques. The results of the research express that adaptive metacognition improves by using scaffolding tools such as erotetic matrix.

The article discusses the research results and presents two case studies in order to describe the nature of metacognitive behaviors in teachers. We conclude the paper by presenting the A-HA approach, designed to help teachers to improve their metacognitive capabilities.

Ramona Henter. (2014) conducted a study "Metacognitive Training for Students Preparing to Be Kindergarten and Primary School Teachers". Metacognition is generally defined as "thinking about thinking" and represents a major factor in academic performance. Metacognition, through its two dimensions, knowledge about cognition and regulation of cognition, reflects what people know about cognition in general and about their own cognitive processes, in particular, as well as how they use this knowledge to adjust their informational processes and behaviour to specific situations.

These dimensions are crucial for any teacher, not only for their own job performance, but also for developing metacognitive strategies in their students. This is why we think that students who are training to become teachers should attend a programme for developing their metacognition.

We designed and implemented such a programme, embedded with the fundamental knowledge of the subject matter taught, for the first year students attending compulsory classes of Developmental Psychology. The programme aimed at raising their metacognitive awareness level and at raising knowledge about metacognitive teaching and learning strategies. The results indicate the possibility of teaching and learning the metacognitive skills when integrated in the content to be taught and used continuously during a university semester.

Oluwole O. Durodolu. (2014) Search Strategy, Self-Concept and Metacognitive Skills of Secondary School Teachers in Selected Cities in Nigeria and South Africa. Information Literacy (IL) is fundamental for lifelong learning, especially for the teaching profession, where information is critical for imparting knowledge to students who are expected to be creative, critical thinkers and lifelong learners. The study investigates the search strategy, self-concept and metacognitive skills of secondary school teachers in selected cities in Nigeria and South Africa.

The study adopted a post-positivist research paradigm combining both qualitative and quantitative research methodologies largely through a multi- case study research design. Data were gathered through questionnaires, interviews, observation and document analysis that included a literature review. The target population was secondary school teachers in Lagos and Durban.

The sample for the research was drawn from teachers in government secondary schools in Lagos and Durban. A multi-stage sampling technique was used in the first stage to purposively select samples from the two cities of Lagos and Durban in order to make comparisons. The second stage involved stratified random sampling, and the third stage applied simple random sampling. Literature analysis and the Technology Acceptance Model (TAM) were used to inform the study.

The study revealed the following: (i) teachers in Durban had a higher level of perception of the need for information literacy than their counterparts in Lagos; (ii) electronic information resources were infrequently used by the teachers; (iii) younger teachers tended to possess a higher level of information literacy than their older colleagues, which proves why in-service training is imperative; (iv) female teachers were significantly more information literate than their male counterparts; (v) many of the school libraries seem to have been afterthoughts, and the specifications for library building and planning were not observed as itemized by IFLA library building guidelines; and (vi) interaction and collaboration between teachers and librarians was limited. Recommendations have been made regarding how the issues and challenges could be addressed and solved with IL policy and work shopping of teachers for IL.

Geeta Shetty. (2014) conducted a study on "Metacognition Levels of Student Teachers On The Basis Of Their Learning Styles". Metacognition and Learning styles are significant factors that influence learning. Metacognition is the awareness of one's own patterns of thinking. Metacognitive awareness helps a learner to be self directed and self regulated. Learners exhibit different learning styles that influence the way they make sense of the learning experiences. The study aimed at finding out the learning styles that showed higher levels of Metacognition.

The Descriptive Survey Method was adopted for the study. A sample of 172 student teachers were administered the Metacognitive Awareness Inventory (Schraw and Dennison-1994) and The Myers-Briggs Type Indicator (MBTI -1977). The data collected was analyzed using the 't – test' to compare the Mean scores on Metacognition of student teachers having different learning styles. The results showed that the combination that emerged the highest among student teachers was ESFJ (Extraversion, Sensing, Feeling and Judging). However student teachers with the learning styles Introversion and Thinking were found to be significantly higher in Metacognition as compared to student teachers with the learning styles Extraversion and Feeling.

Saeedeh Shafiee Nahrkhalaji. (2014) conducted a study on "EFL Teachers' Metacognitive Awareness as a Predictor of Their Professional Success". Metacognitive knowledge increases EFL students' ability to be successful learners. Although this relationship has been investigated by a number of scholars, EFL teachers' explicit awareness of their cognitive knowledge has not been sufficiently explored.

The aim of this study was to examine the role of EFL teachers' metacognitive knowledge in their pedagogical performance. Furthermore, the role played by years of their academic education and teaching experience was also studied. Fifty female EFL teachers were selected. They completed Metacognitive Awareness Inventory (MAI) that assessed six components of metacognition including procedural knowledge, declarative knowledge, conditional knowledge, planning, evaluating, and management strategies. Near the end of the academic semester, the students of each class filled in 'the Language Teacher Characteristics Questionnaire' to evaluate their teachers' pedagogical performance.

Four elements of MAI, declarative knowledge, planning, evaluating, and management strategies were found to be significantly correlated with EFL teachers' pedagogical success. Significant correlation was also established between metacognitive knowledge and EFL teachers' years of academic education and teaching experience. The findings obtained from this research have contributing implication for EFL teacher educators. The discussion concludes by setting out directions for future research.

Arthur K. Ellis. (2012) conducted a study on "An Analytical Literature Review of the Effects of Meta cognitive Teaching Strategies in Primary and Secondary Student Populations". Meta cognition has been an area of interest to educational researchers for more than 40 years. A large body of literature exists on this topic, both theoretical and empirical. However, there are few studies that summarize specific instructional practices for improving students' capacity for meta cognitive thinking. Similarly, there is a dearth of evidence showing how specific practices are implemented to affect student achievement.

This study remediates gaps in these areas by identifying instructional approaches that promote meta cognitive thinking in primary and secondary student populations using analytical literature review methods. Educational textbooks were examined for keywords associated with meta cognition.

Five terms were identified, including meta cognition, strategy, planning, monitoring, and evaluating. These terms were then used to conduct searches in the Educational Resources Information

Centre database. Search criteria included peer reviewed empirical studies with primary and secondary student populations. Studies involving postsecondary students and electronic learning environments were excluded. Thirteen studies were found. These studies were organized into categories using analytical coding procedures. Results were compiled into three summaries.

The first summary identifies features of the learning environment which foster meta cognitive strategy use, such as an engaging curriculum and supportive instruction. The second summary identifies specific meta cognitive strategies, such as modelling, mnemonics, and semantic webs.

The third summary describes specific instructional practices for teaching meta cognitive strategy use by classroom practitioners. Implications of the findings are discussed and suggestions for future research are identified.

Emily R. Lai. (2011) conducted a study on "Metacognition: A Literature Review". Metacognition is defined most simply as "thinking about thinking." Metacognition consists of two components: knowledge and regulation. Metacognitive knowledge includes knowledge about oneself as a learner and the factors that might impact performance, knowledge about strategies, and knowledge about when and why to use strategies.

Metacognitive regulation is the monitoring of one's cognition and includes planning activities, awareness of comprehension and task performance, and evaluation of the efficacy of monitoring processes and strategies. Recent research suggests that young children are capable of rudimentary

forms of metacognitive thought, particularly after the age of 3. Although individual developmental models vary, most postulate massive improvements in metacognition during the first 6 years of life.

Metacognition also improves with appropriate instruction, with empirical evidence supporting the notion that students can be taught to reflect on their own thinking. Assessment of metacognition is challenging for a number of reasons: (a) metacognition is a complex construct; (b) it is not directly observable; (c) it may be confounded with both verbal ability and working memory capacity; and (d) existing measures tend to be narrow in focus and decontextualized from in-school learning. Recommendations for teaching and assessing metacognition are made.

Jeffrey A. Phillips. (2010) conducted a study on "Metacognitive Training in Professional Development". Secondary school students in the United States continue to underachieve in mathematics and science. Improving teacher quality is a core component of improving student achievement. Here we report on a professional development program, the MAST System, that develops the knowledge and skills for teaching mathematics, including metacognitive knowledge and regulation. In this cognitive apprenticeship program, teachers learn to plan, evaluate and adjust to improve student engagement and achievement.

Central is the metacognitive practice of defense of instruction. By practicing this reflective approach, teachers become adaptive experts, able to innovate in the classroom. During the two-year intervention, the MAST System resulted in large increases in the California Standards Test mathematics scores, compared to both the district and the state. In addition, improvement continued

for several years after the intervention was completed. This continued improvement in student scores indicated that the teachers and schools changed in a sustainable way.

A.M. Ma'rof. (2009) conducted a study on "patterns of metacognitive awareness among primary school teachers". The purpose of this study is to identify level and patterns of metacognitive awareness among teachers in primary schools. This study focuses on aspects of declarative knowledge, procedural knowledge, conditional knowledge, planning, monitoring and evaluation of teachers.

The study was descriptive in nature. A sample of 100 primary school teachers in Puchong, Selangor answered the Metacognitive Awareness Inventory for Teacher by Cem Balcikanli (2011). The data analysis was carried out using IBM Statistics version 24 to obtain descriptive measures.

The results show that levels of metacognitive awareness among teachers are high at ninety three percent (93%). The results also show that there are no significant differences by gender, age, teaching experience, academic qualification and subject of teaching among primary school teachers. The metacognitive framework shows that metacognition knowledge and regulatory expertise were used by individuals to control their cognition. Teachers who have a higher level of metacognitive awareness can produce students with good academic achievement.

Stephan du Toit. (2009) conducted a study on "Meta cognitive Strategies in the Teaching and Learning of Mathematics". The broad aim of this study was to investigate the use of meta cognitive

strategies by Grade 11 mathematics learners and their teachers. Two objectives were stated: To investigate which meta cognitive strategies Grade 11 mathematics learners and mathematics teachers can employ to enhance meta cognition among learners, and to investigate the extent to which Grade 11 mathematics learners and teachers use meta cognitive strategies.

Questionnaires were used to obtain quantitative data about the use of metacognitive strategies by learners and teachers. The findings indicate that planning strategy and evaluating the way of thinking and acting were used most by both teachers and learners. Journal - keeping and thinking aloud were used least by teachers and learners.

Tarja-Riitta Hurme. (2009) conducted a study on "Socially shared metacognition of pre-service primary teachers in a computer-supported mathematics course and their feelings of task difficulty: a case study". Collaborative learning assumes that knowledge is constructed through negotiation and discussion. This exploratory study focuses on 2 groups of 3 pre-service primary teachers solving 2 mathematical tasks in a text-based and asynchronous WorkMates learning environment. This case study describes the group processes, and the different patterns of group interaction are analyzed.

The assumption is that the process of socially shared metacognition is especially effective in learning how to solve problems in groups. Socially shared metacognition emerges when a group member regulates a group's problem-solving process and the other group members react to the initiative. Individuals' retrospectively reported feelings of difficulty during the task are taken as a measure to show whether group interactions contribute to individual learning. The results suggest that, when socially shared metacognition emerges, individuals' feelings of difficulty decrease.

Important is that individual group members with adequate (meta)cognitive skills take the initiative and other members react upon it. Suggestions for future research are discussed.

Xiaodong Lin. (2005) made a study on "Toward Teachers' Adaptive Metacognition". The researchers compare conventional uses of metacognition with the kinds of metacognition required by the teaching profession. We discover that many of problems and tasks used in successful metacognitive interventions tend to be reasonably well-defined problems of limited duration, with known solutions. Teaching has unique qualities that differentiate it from many of the tasks and environments that metacognitive interventions have supported. Teachers often confront highly variable situations. This led us to believe that successful teaching can benefit from what we call adaptive metacognition, which involves change to oneself and to one's environment, in response to a wide range of classroom social and instructional variability.

The authors present several examples to illustrate the nature of metacognition required by teachers and the challenges of helping teachers recognize situations that require adaptive metacognition. The researchers conclude the article by describing an approach, critical event-based instruction, which we have recently developed to help teachers appreciate the need for metacognitive adaptation by seeing the novelty in everyday recurrent classroom events.

2.5 CONCLUSION

It is found that several studies have been several studies have been conducted with the variable metacognition in abroad and in India. Metacognition has been studied among students but

few studies have been done with teachers as sample. Hence the present study has been done based on the concrete support from previous studies.

2.6 BRIEF RESUME OF SUCCEEDING CHAPTER

Chapter – III focuses on research design, method of data processing, description of variables, sampling distribution, selection and development of tools, pilot study, and description of tools and administration of tools.

CHAPTER – III

RESEARCH FRAMEWORK AND DESIGN OF THE STUDY

3.1 INTRODUCTION

This chapter deals with the design of the study, the sampling, tools used for the study and the method of data collection and data analysis. The design of the study gives a preliminary idea to the researcher about the entire structure of research and the appropriate methodology adopted. It helps the researcher to obtain the stated objectives in a clear way and to test those using correct methods and to draw out results of the study.

3.2 DESIGN OF THE STUDY

The entire research design of this present study is given in the following table.

Table 3.1 showing the entire design of the study

S. No.	Type	Sources
1	Nature of research	Normative survey method
2.	Research Variables	Metacognitve skills
3.	Tools used	1.Metacognitive skills – constructed and validated by the Dr. R. Diane joseph. (2018), APRC, New Delhi
4.	Sampling technique	Random sampling

5.	Size of the sample	Primary School teachers
6.	Sub-samples	
	Gender	Male teachers Female teachers
	Locality	Rural Urban
	Nature of school	Government Private
	Teaching experience	Above 5 years Below 5 years
	Type of family	Joint family Nuclear family
	Marital status	Unmarried Married
	Generation	1st generation learner Other generation learner

7.	Statistical techniques used	Descriptive analysis Differential analysis

3.3 OBJECTIVES OF THE STUDY

The following are the objectives of the study:

Primary objectives

3. To study the metacognitive skills among Primary school teachers in Cuddalore district.

Secondary objectives

4. To study the differences in metacognitive skills among Primary school teachers in Cuddalore district with respect to the following personal variables

    8. Gender
    9. Locality
    10. Nature of school
    11. Teaching experience
    12. Type of family

13. Marital status

14. Generation of learners

3. 4 HYPOTHESES OF THE STUDY

The following are the hypotheses of the study:

1. The level of metacognition among Primary school teachers is high.
2. There is no significant mean difference among male and female Primary school teachers in their metacognition.
3. There is no significant mean difference among rural and urban primary school teachers in their metacognition.
4. There is no significant mean difference among government and private primary school teachers in their metacognition.
5. There is no significant mean difference among above and below 5 years teaching experienced primary school teachers in their metacognition.
6. There is no significant mean difference among nuclear and joint family primary school teachers in their metacognition.
7. There is no significant mean difference among married and unmarried primary school teachers in their metacognition.
8. There is no significant mean difference among 1^{st} and other generation learner of primary school teachers in their metacognition.

3.5 METHOD OF INVESTIGATION AND DATA PROCESSING

Descriptive survey or normative surveys are often carried out as preliminary step to be followed by researcher employing more vigorous control and more objective methods. It also serves as direct sources of valuable knowledge concerning human behaviour. The universal application of the descriptive method to educational planning, school surveys are conducted to help, solve the problems of various aspects, of school i.e. school plans, school maintenance, teaching staff, curriculum, teaching methods, learning objective and the like.

The following are the main characteristics of the normative survey method of research (Sharma R.A, 2004):

1. The survey method gathers data from a relatively large number of cases at a particular time.
2. It is essentially cross-sectional.
3. It is not concerned with the characteristics of individuals.
4. It involves clearly defined problem.
5. It requires experts imaginative planning.
6. It requires careful analysis and interpretation of the data gathered.
7. It requires logical and skilful reporting of the findings.
8. Surveys vary greatly in complexity.
9. It does not seek to develop an organized body of scientific principles.
10. It provides information useful to the solution of local problems.
11. It contributes to the advancement of knowledge as it affords penetrating insight into the nature of what one is dealing with.
12. It suggests the course of future developments.
13. It determines the present trend and solves current problems.
14. It helps in fashioning many tools with which we do the research.

In the present study normative method was used to study the variables of the sample of primary school teachers in Cuddalore District. The data was collected by the paper pencil test. The scores of the paper pencil test was entered into the excel spread sheets. The data collected from the subjects was computed by using Statistical package for social sciences Version 17.0 package.

3.6 DESCRIPTION OF VARIABLES

Metacognitive skills

"Metacognition refers, among other things, to the active monitoring and consequent regulation and orchestration of these processes … usually in service of some concrete goal or objective".

“Metacognition” as a term that was coined in the 1970s and only occasionally appearing in the literature of the early 1980s, but appearing with growing frequency through the decade, becoming (with problem solving) probably the most clichéd and least understood buzz words of the 1980s.

In the field of education, metacognition is often referred to as thinking about one’s own thinking processes. Yet, metacognition also can be understood as a range of executive system processes that are intimately involved in self assessment, cognitive control, and monitoring, such as controlling the amount of time spent studying and assessing whether we understand a text. Through ongoing monitoring and control of cognition, metacognition enables us to recognize the “absence of

knowledge" in a given context. Metacognitive processes depend on a complex interplay of several distinct brain regions known to be responsible for attention to task, self-awareness, memory, and even individual expectations.

Knowledge about cognition corresponds to what students know about themselves, strategies, and conditions under which strategies are most useful. Declarative, procedural, and conditional knowledge can be thought of as the building blocks of conceptual knowledge.

Regulation of cognition corresponds to knowledge about the way students plan, implement strategies, monitor, correct comprehension errors, and evaluate their learning.

3.7 SAMPLE DISTRIBUTION

The sample consists of primary school teachers of Cuddalore District. Random sampling procedure was adopted.

The data collected schools are given in the following table 3.2

Table 3.2 showing the list of schools and the sample size

Sl.No.	Name of the school	Sample size

1	PUMS, Kilimangalam	27
2	PUPS, THOTTI, C. PUDUPETTAI, VELANGADU, OTTERI	50
3	PUPS, VAYALAMOOR	14
4	GOVT. ADW PRIMARY SCHOOL, PATTIKUDIKADU	14
5	VALLALAR HR.SEC.SCHOOL, VADALUR	22
6	ST. PAUL's HIGHER SECONDARY SCHOOL	15
7	KRISHNASWAMY HR.SEC SCHOOL	10
Total		152

Details of the background variables

The details of the background variables are given in the following table 3.3:

Table 3.3 showing the details of the background variables

Personal variables	**Category**	**N**	**Percentage**
Gender	Male	17	11.18
	Female	135	88.81

Locality	Rural	75	49.34
	Urban	77	50.65
Nature of school	Government	67	44.07
	Private	85	55.92
Teaching experience	Above 5 years	63	41.44
	Below 5 years	89	58.55
Type of family	Joint	32	21.05
	Nuclear	120	78.94
Martial status	Unmarried	35	23.02
	Married	117	76.97
Generation	1st generation learner	64	42.10
	Other generation learner	88	57.89

3.8 TOOLS USED

METACOGNITIVE SCALE

Based on the type of sample and the relevance of study the following tools were used in the present investigation. The first tool called metacognitive scale was standardized for the population of school teachers by the Dr. R. Diane joseph (2018) and published in Agra Psychological Research Cell.

Content validity of the tool

The content validity of the tool is established by using inter correlation across the different components of the variable metacognition.

Table 3.4 showing inter-correlations of the component: Knowledge about Cognition

	Declarative Knowledge	Procedural Knowledge	Conditional Knowledge	knowledge about cognition
Declarative Knowledge	1	.724**	.620**	.820**
Procedural Knowledge	.724**	1	.543**	.741**
Conditional Knowledge	.620**	.543**	1	.948**
Knowledge about cognition	.820**	.741**	.948**	1

Table 3.5 showing inter-correlations of the component: Regulation of Cognition

	planning	Information Management Strategy	Comprehension Monitoring	Debugging Strategy	Evaluation	Regulation of cognition
Planning	1	.509**	.637**	.678**	.806**	.830**
Information Management Strategy	.509**	1	.609**	.632**	.717**	.773**
Comprehension Monitoring	.637**	.609**	1	.676**	.807**	.855**
Debugging Strategy	.678**	.632**	.676**	1	.802**	.884**
Evaluation	.806**	.717**	.807**	.802**	1	.972**
regulation of cognition	.830**	.773**	.855**	.884**	.972**	1

From the table 3.4 And 3.5, it is evident that all the components of metacognition are interrelated to each other indicating a good internal consistency of the tool.

Reliability of the tool

The alpha reliability of the identified variables was computed. The Cronbach's Alpha reliability of the tool was found to be .946, indicating a primary reliability index and hence the tool is retained for actual study.

3.9 MAIN STUDY

Normative survey method was followed. Main study has been conducted on the sample of 152 primary school teachers selected based on the random sampling procedure. The pilot studied tools have been drafted into final form and were administered to the sample. Proper instructions were given to the teachers before the collection of the data.

3.10 ADMINISTRATION OF TOOLS

All the tools were given to the teachers who acted as the representative sample of the study. The subjects were given prior instructions about the intention of the study, the way to answer the questionnaire etc… After giving the instructions they were allowed to attend the items in the questionnaire. Ample time was given to complete the questionnaire. Finally, before the collection of the tools from the subjects data collection sheet was checked properly to identify whether all the items were answered by the subjects. The subjects were assured about the confidentiality of the data.

3.11 STATISTICAL TECHNIQUES APPLIED

The data colleted by the investigator from the sample were analyzed statistically. In the present study the relevant data collected were secured by primary school teachers in metacogntive skills. These data were analyzed by employing the following statistical tools to arrive at meaningful conclusions. The following statistical methods were applied to analyze the scores on each dimension and on each variable.

3.11.1 DESCRIPTIVE ANALYSIS

It provides information about the nature of a particular group of individuals. To compare the two main groups, mean and standard deviations were calculated. The essential descriptive analysis served as inputs for further inferential analysis.

In the present investigation mean and standard deviation of scores were calculated from the scores in the scales of metacognition and teacher effectiveness and it is discussed in chapter 4.1.

3.11.2 DIFFERENTIAL ANALYSIS

It provides inferences involving determination of statistical significance of difference between groups with reference to the selected variables.

In the present study, 't' value was calculated to test the significant difference between the mean scores of two groups in research variables and personal variables and it is discussed in chapter 4.2.

3.12 BRIEF RESUME OF THE SUCCEEDING CHAPTER

The chapter – IV deals with Analysis and interpretation of the data, hypothesis testing pertaining to research variables and personal variables and its discussion.

CHAPTER –IV

ANALYSIS AND INTERPRETATION

4.1 INTRODUCTION

This chapter deals with the analysis and interpretation of the collected data, which the investigator collected by the implementation of the tool of research. Analysis of data means studying the tabulated material in order to determine inherent facts or meanings. It is a process, which involves breaking down existing complex factor into simpler parts and putting together in new arrangements for the purpose of interpretation. While analyzing the data, an investigator usually makes use of the statistical techniques, which are necessary for the purpose of the study and present the result in an organized and meaningful form.

In the present study the relevant data collected were the scores of the metacogntive scale from Cuddalore district. The data were employed by employing the following statistical techniques to arrive at meaningful conclusions.

4.2 HYPOTHESIS TESTING

Hypothesis 1

The level of metacognition among primary school teachers is high

The data has been classified related to various groups and subgroups based on selected research variables and their categories. Arithmetic mean and standard deviation for whole sample were computed and presented in table 4.1

Table 4.1 showing

Mean and Standard deviation of metacognition

Variables	**N**	**Whole sample**	
		Mean	**S.D**
Metacognition	152	436.36	28.83

From the table 4.1 is found that the mean value of metacognition is 436.36 and hence the selected sample of teachers have a good level of metacognition.

Table 4.2 showing Mean and Standard deviation of metacognition with respect to the background variables

Personal variables	**Category**	**N**	**Metacognition**	
			Mean	**S.D**
Gender	Male	17	431.88	23.49
	Female	135	436.92	29.46
Locality	Rural	75	435.91	24.72
	Urban	77	436.79	32.49
Nature of school	Government	67	436.99	34.04
	Private	85	435.85	24.15

Teaching experience	Above 5 years	63	435.95	25.85
	Below 5 years	89	436.64	31.06
Type of family	Joint family	32	435.06	27.54
	Nuclear family	120	436.60	29.27
Marital status	Unmarried	35	442.00	22.48
	Married	117	434.67	30.35
Generation	1st generation learner	64	433.88	32.51
	Other generation learner	88	438.16	25.87

From the table 4.2 it is found that the different categories of school teachers vary in their mean and standard deviation of the metacognition with respect to personal variables.

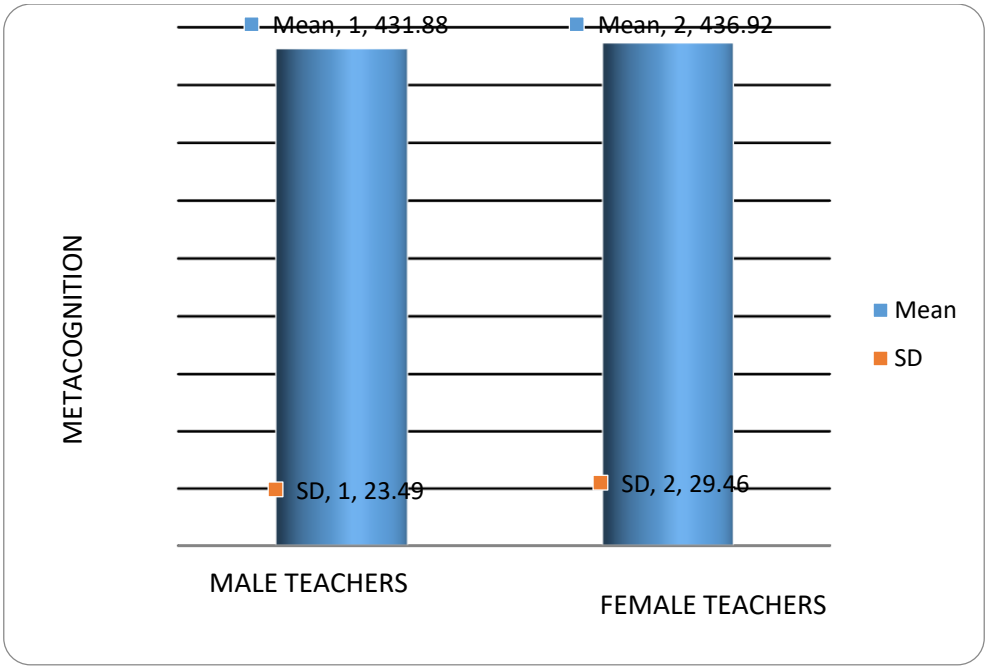
Hypothesis 2

There is no significant mean difference among male and female primary school teachers in their metacognition

Table 4.3 showing the Mean, standard deviation and 't'- value of the metacognition with respect to the male and female school teachers

Variable	Groups	n	Mean	S.D	t- value	df	Level of significance at .05 level
Metacognition	Male teachers	17	431.88	23.49	.677	150	Not significant
	Female teachers	135	436.92	29.46			

Figure 4.1 showing the Mean, standard deviation and 't'- value of the metacognition with respect to the male and female primary school teachers



From the table 4.3 and the figure 4.1 it is found that the computed t – value (.677) is lesser than the table value at 0.05 level of significance, hence the null hypothesis is accepted. Therefore there is no mean difference among male and female primary school teachers in their metacognition.

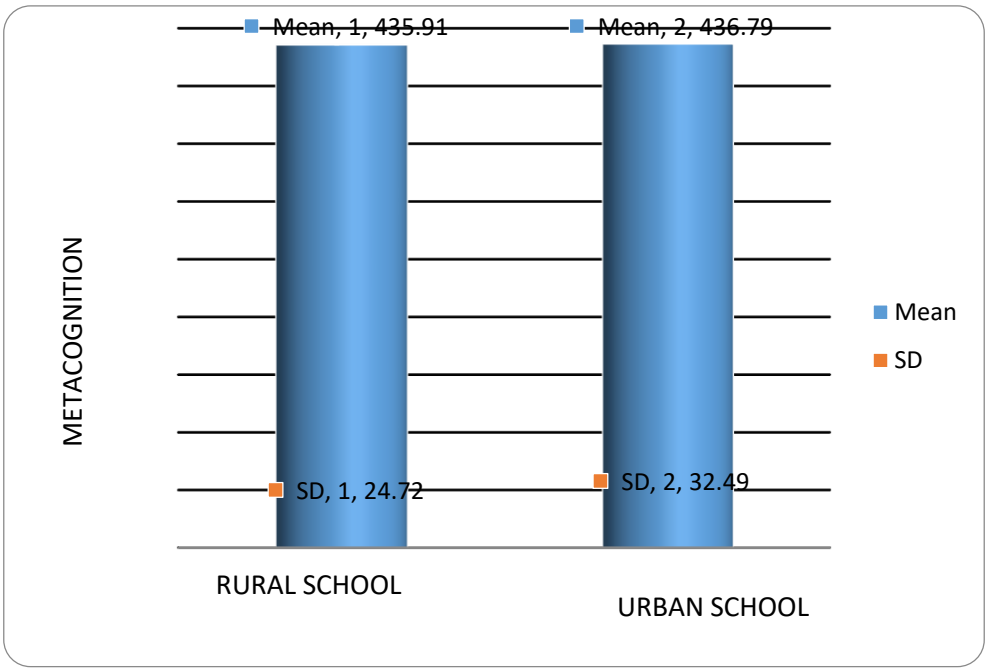
Hypothesis 3

There is no significant mean difference among rural and urban primary school teachers in their metacognition

Table 4.4 showing the Mean, standard deviation and 't'- value of the metacognition with respect to the rural and urban primary school teachers

Variable	Groups	n	Mean	S.D	t- value	df	Level of significance at .05 level
Metacognition	Rural school	75	435.91	24.72	.189	150	Not significant
	Urban school	77	436.79	32.49			

Figure 4.2 showing the Mean, standard deviation and 't'- value of the metacognition with respect to the rural and urban primary school teachers



From the table 4.4 and the figure 4.2 it is found that the computed t – value (.189) is lesser than the table value at 0.05 level of significance, hence the null hypothesis is accepted. Therefore there is no mean difference among rural and urban primary school teachers in their metacognition.

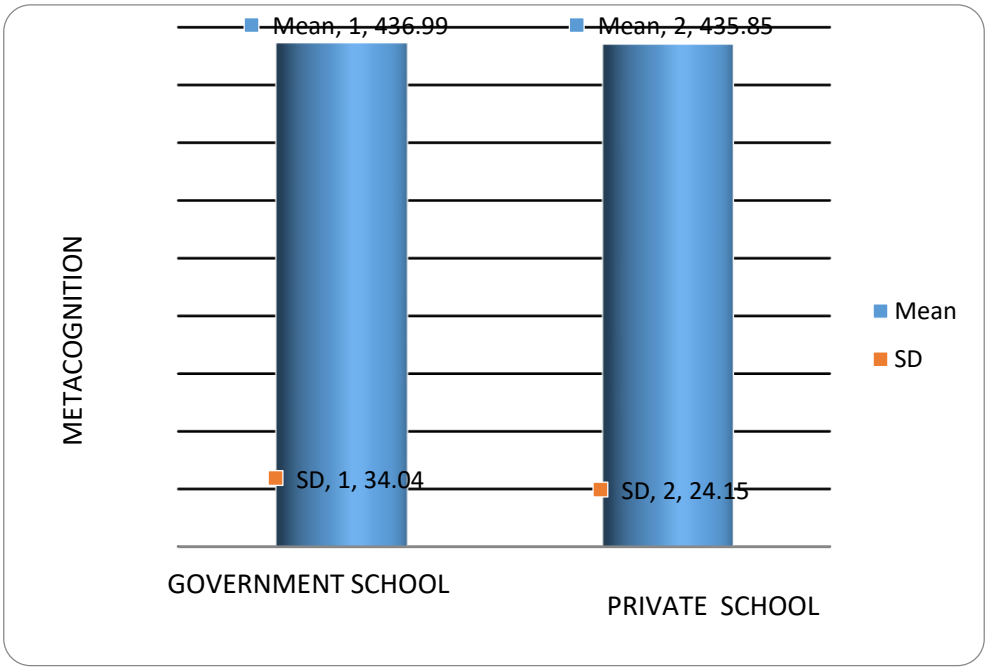
Hypothesis 4

There is no significant mean difference among government and private primary school teachers in their metacognition

Table 4.5 showing the Mean, standard deviation and 't'- value of the metacognition with respect to the government and private primary school teachers

Variable	Groups	n	Mean	S.D	t- value	df	Level of significance at .05 level
Metacognition	Government school	67	436.99	34.04	.238	150	Not significant
	Private school	85	435.85	24.15			

Figure 4.3 showing the Mean, standard deviation and 't'- value of the metacognition with respect to the government and private primary school teachers



From the table 4.5 and the figure 4.3 it is found that the computed t – value (.238) is lesser than the table value at 0.05 level of significance, hence the null hypothesis is accepted. Therefore there is no mean difference among government and private primary school teachers in their metacognition.

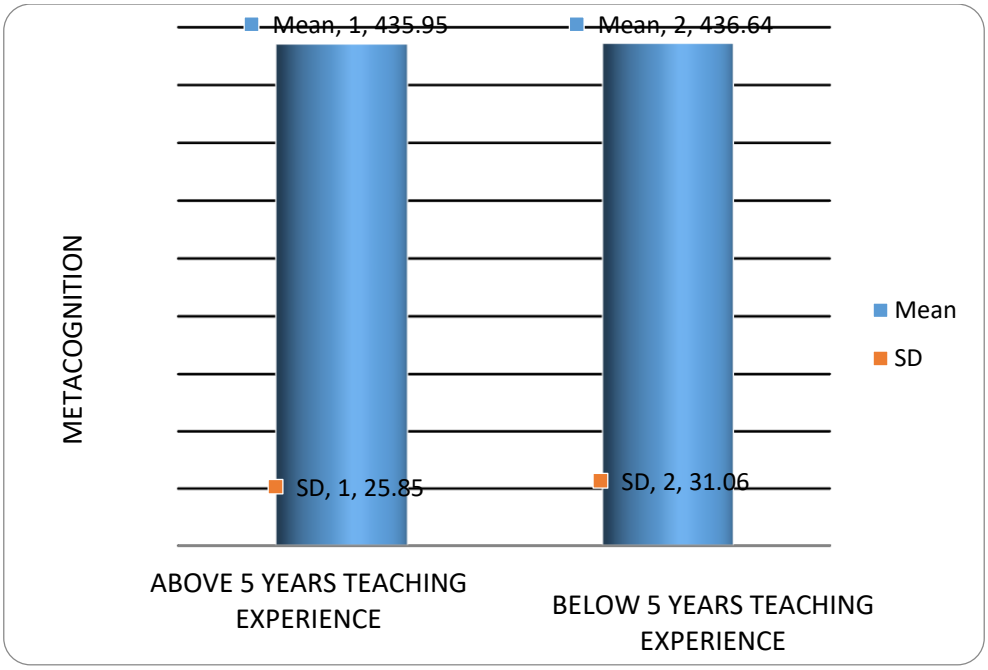
Hypothesis 5

There is no significant mean difference among above and below 5 years teaching experienced primary school teachers in their metacognition

Table 4.6 showing the Mean, standard deviation and 't'- value of the metacognition with respect to the above and below 5 years teaching experienced primary school teachers

Variable	Groups	n	Mean	S.D	t- value	df	Level of significance at .05 level
Metacognition	Above 5 year teaching experience teachers	63	435.95	25.85	.144	150	Not significant
	Below 5 year teaching experience teachers	89	436.64	31.06			

Figure 4.4 showing the Mean, standard deviation and 't'- value of the metacognition with respect to the Above 5 year and below 5 year teaching experience primary school teachers



From the table 4.6 and the figure 4.4 it is found that the computed t – value (.144) is lesser than the table value at 0.05 level of significance, hence the null hypothesis is accepted. Therefore there is no mean difference among above and below 5 year teaching experience primary school teachers in their metacognition.

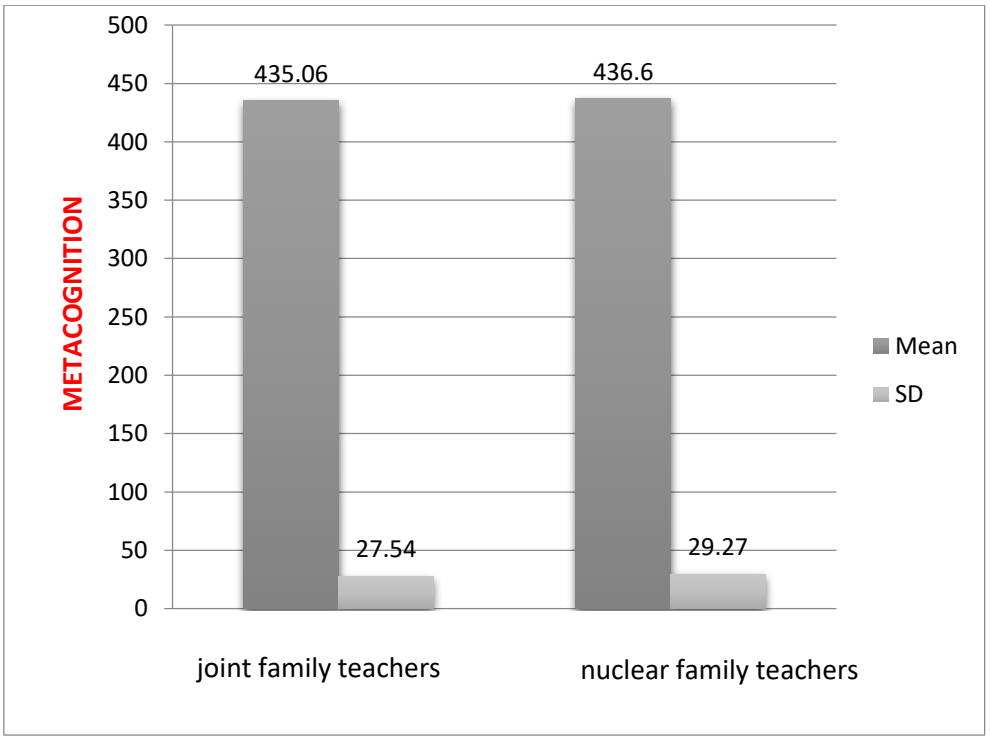
Hypothesis 6

There is no significant mean difference among above joint and nuclear family primary school teachers in their metacognition

Table 4.7 showing the Mean, standard deviation and 't'- value of the metacognition with respect to the joint and nuclear family primary school teachers

Variable	Groups	n	Mean	S.D	t- value	df	Level of significance at .05 level
Metacognition	Joint family teachers	32	435.06	27.54	.285	150	Not significant
	Nuclear family teachers	120	436.60	29.27			

Figure 4.5 showing the Mean, standard deviation and 't'- value of the metacognition with respect to the joint and nuclear family primary school teachers



From the table 4.7 and the figure 4.5 it is found that the computed t – value (.285) is lesser than the table value at 0.05 level of significance, hence the null hypothesis is accepted. Therefore there is no mean difference among joint and nuclear family primary school teachers in their metacognition.

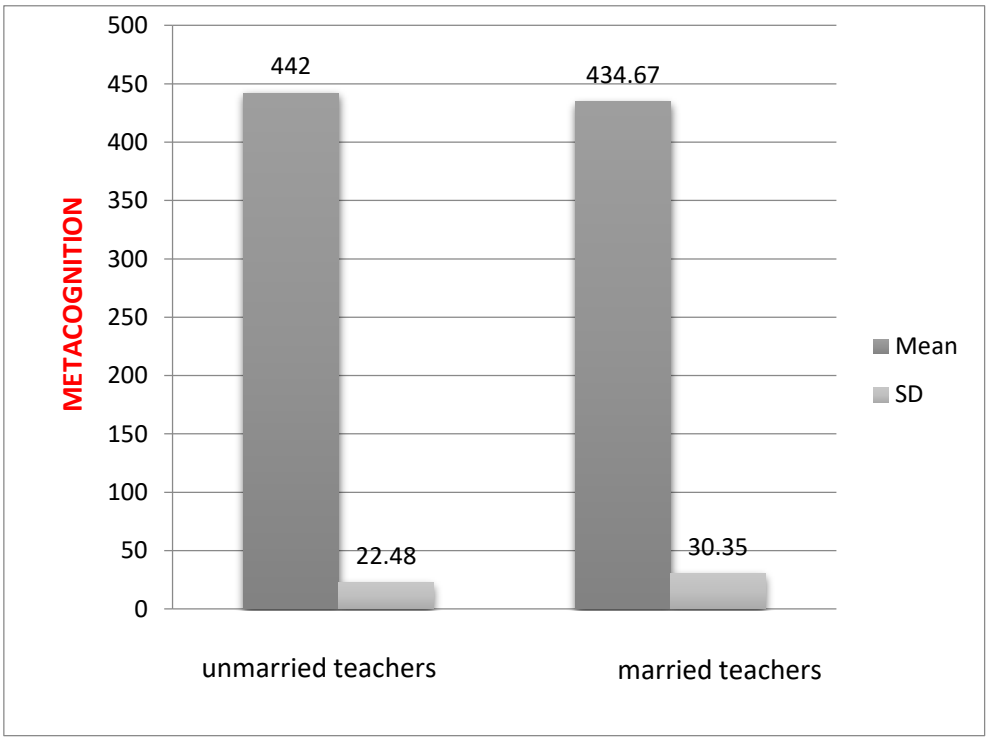
Hypothesis 7

There is no significant mean difference among unmarried and married primary school teachers in their metacognition

Table 4.8 showing the Mean, standard deviation and 't'- value of the metacognition with respect to the unmarried and married primary school teachers

Variable	**Groups**	**n**	**Mean**	**S.D**	**t- value**	**df**	**Level of significance at .05 level**
Metacognition	Unmarried teachers	35	442.00	22.48	1.323	150	Not significant
	Married teachers	117	434.67	30.35			

Figure 4.6 showing the Mean, standard deviation and 't'- value of the metacognition with respect to the unmarried and married given primary school teachers



From the table 4.8 and the figure 4.6 it is found that the computed t – value (1.323) is lesser than the table value at 0.05 level of significance, hence the null hypothesis is accepted. Therefore

there is no mean difference among unmarried and married primary school teachers in their metacognition.

Hypothesis 8

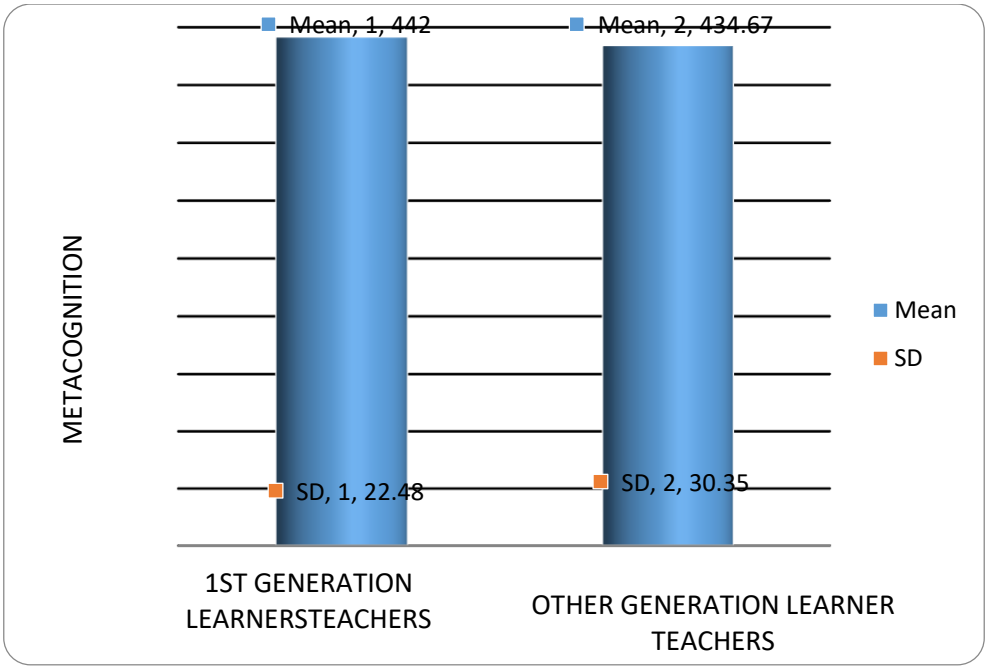
There is no significant mean difference among 1st and other generation learner of primary school teachers in their metacognition

Table 4.9 showing the Mean, standard deviation and 't'- value of the metacognition with respect to the 1st and other generation learner of primary school teachers

Variable	Groups	n	Mean	S.D	t- value	df	Level of significance at .05 level
Metacognition	1st generation learner of teachers	64	433.88	32.51	.904	150	Not significant

	Other generation learner of teachers	88	438.16	25.87			

Figure 4.7 showing the Mean, standard deviation and 't'- value of the metacognition with respect to the 1st and other generation learner of primary school teachers



From the table 4.9 and the figure 4.7 it is found that the computed t – value (.904) is lesser than the table value at 0.05 level of significance, hence the null hypothesis is accepted. Therefore there is no mean difference among 1st and other generation learner of primary school teachers in their metacognition.

CHAPTER – V

SUMMARY, MAJOR FINDINGS, DISCUSSION AND CONCLUSION, RECOMMENDATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

5.1 INTRODUCTION

Metacognition involves thinking about one's thinking, or cognition, with the goal of enhancing learning. Much of the educational theory and research surrounding metacognition is based on the work of developmental psychologist John Flavell, who applied this terminology in describing the management of information-processing activities that occur during cognitive transactions.

"Metacognition refers, among other things, to the active monitoring and consequent regulation and orchestration of these processes … usually in service of some concrete goal or objective".

“Metacognition” as a term that was coined in the 1970s and only occasionally appearing in the literature of the early 1980s, but appearing with growing frequency through the decade, becoming (with problem solving) probably the most clichéd and least understood buzz words of the 1980s.

In the field of education, metacognition is often referred to as thinking about one’s own thinking processes. Yet, metacognition also can be understood as a range of executive system processes that are intimately involved in self assessment, cognitive control, and monitoring, such as

controlling the amount of time spent studying and assessing whether we understand a text. Through ongoing monitoring and control of cognition, metacognition enables us to recognize the “absence of knowledge” in a given context. Metacognitive processes depend on a complex interplay of several distinct brain regions known to be responsible for attention to task, self-awareness, memory, and even individual expectations.

Historically, metacognition has included the concept of metacognitive knowledge, recognizing that learners must have knowledge or awareness of strategies such as rehearsal, use of mnemonics, and content organization, which can all be mobilized during learning.

The impact of metacognition over teacher effectiveness is aimed to be studied in the present study.

5.2 RESEARCH METHOD AND DESIGN

The research method

Normative survey method was used to collect data. The normative survey method is used in research to describe a trait or phenomenon that is present in a group or used to find the relationship between two or more variables. The term normative survey is generally used for the type of research, which proposes to ascertain what is the normal or typical condition or practice at the present time. The present study aims to find out the relationship between metacognition and teacher effectiveness. Hence normative survey method was selected for this study.

5.3 RATIONALE OF THE STUDY

The effectiveness of education system depends on the effectiveness of its teachers. Most of the classroom teaching in India continues to be teacher dominated hence we should pay more attention towards teacher effectiveness so that the future generation are to be adequately prepared to face the changing time. For this purpose, there must be a sound theory at the bottom of teacher effectiveness. Secondary school teachers occupy a place of crucial importance.

The future of the country inevitably rests on them. It is prominent for them to earn public recognition by their enlightened devoting and professional efficiency. Higher standards of efficiency and integrity may themselves contribute to their status. Therefor**e,** the present study was conducted on secondary school teachers.

Through this study the investigator wants to examine teacher effectiveness in relation to meta-cognitive strategy. The effect of background variables namely gender, locality, nature of school, teaching experience, educational qualification, results and generation of learners over the research variables namely: metacognition and teacher effectiveness.

5.4 OBJECTIVES OF STUDY

The following are the objectives of the study:

Primary objectives

5. To study the metacognitive skills among primary school teachers in Cuddalore district.

Secondary objectives

6. To study the differences in metacognitive skills among primary school teachers in Cuddalore district with respect to the following personal variables

    15. Gender
    16. Locality
    17. Nature of school
    18. Teaching experience
    19. Educational qualification
    20. Results given
    21. Generation of learners

5.5 HYPOTHESES OF STUDY

The following are the hypotheses of the study:

9. The level of metacognition among Primary school teachers is high.
10. There is no significant mean difference among male and female Primary school teachers in their metacognition.
11. There is no significant mean difference among rural and urban primary school teachers in their metacognition.

12. There is no significant mean difference among government and private primary school teachers in their metacognition.
13. There is no significant mean difference among above and below 5 years teaching experienced primary school teachers in their metacognition.
14. There is no significant mean difference among nuclear and joint family primary school teachers in their metacognition.
15. There is no significant mean difference among married and unmarried primary school teachers in their metacognition.
16. There is no significant mean difference among 1st and other generation learner of primary school teachers in their metacognition.

5.6 TOOLS USED IN THE STUDY

The following tools are used for this investigation.

METACOGNITIVE SCALE

Based on the type of sample and the relevance of study the following tools were used in the present investigation. The first tool called metacognitive scale was standardized for the population of school teachers by the Dr. R. Diane joseph (2018) and published in Agra Psychological Research Cell.

Reliability of the tool

The alpha reliability of the identified variables was computed. The Cronbach's Alpha reliability of the tool was found to be .946, indicating a primary reliability index and hence the tool is retained for actual study.

5.7 SAMPLE OF THE STUDY

Normative survey method was followed. Main study has been conducted on the sample of 152 primary school teachers selected based on the random sampling procedure. The pilot studied tools have been drafted into final form and were administered to the sample. Proper instructions were given to the teachers before the collection of the data.

5.8 COLLECTION OF DATA

All the tools were given to the teachers who acted as the representative sample of the study. The subjects were given prior instructions about the intention of the study, the way to answer the questionnaire etc… After giving the instructions they were allowed to attend the items in the questionnaire. Ample time was given to complete the questionnaire. Finally, before the collection of the tools from the subjects data collection sheet was checked properly to identify whether all the items were answered by the subjects. The subjects were assured about the confidentiality of the data.

5.9 STATISTICAL DESIGN FOR DATA ANALYSIS

The following Statistical techniques applied for this investigation:

1. Descriptive analysis
2. Differential analysis

5.10 MAJOR FINDINGS

The following are the hypotheses of the study:

1. There is relationship among the metacognition and teacher effectiveness among school teachers.
2. There is no significant mean difference among male and female school teachers in their metacognition.
3. There is no significant mean difference among rural and urban school teachers in their metacognition.
4. There is no significant mean difference among government and private school teachers in their metacognition.
5. There is no significant mean difference among above and below 5 years teaching experienced school teachers in their metacognition.
6. There is no significant mean difference among nuclear and joint family school teachers in their metacognition.

7. There is no significant mean difference among married and unmarried teachers in their metacognition.
8. There is no significant mean difference among 1st and other generation learner of teachers in their metacognition.

5.11 RECOMMENDATIONS

The investigator puts forth some of the following recommendations:

1. Teachers metacognitive skills plays a direct role in the effectiveness of teachers and hence metacognitive skills must be enhanced through workshops and trainings.
2. There is some effect of the background variables over the metacognitve skills and hence while enhancing the metacognitive skills the effect of the background variable should be considered.
3. Teachers must be trained in metacognitive skills through inservice and preservice mode of training.
4. An assessment of metacognitive skills must be made among teachers so as to diagnose the level of metacognitive skills.

5. While considering the teacher effectiveness the role of metacognitive skills must be considered.

5.12 SUGGESTIONS FOR FURTHER RESEARCH

The investigator leaves the following suggestions for further research:

1. The same study could be done to various functionaries of school.
2. The construct metacognition could be studied in depth to yield further information.
3. A workshop module could be created and validated based on this study for providing a standardized training of these skills**.**
4. A qualitative approach could be used to study these variables.
5. Statistical procedures like factorial analysis can be further applied to identify the prime factors.

5.13 FACILITATION OF METACOGNITION

Here are some strategies which teachers can use in their classroom to help students develop metacognition.

1. **Identifying "what is known" and "what is not known"**

At the beginning of a research activity students need to make conscious decisions about their knowledge. Initially students write "What they already know about…" and "What they want to learn about…" As students research the topic, they will verify, clarify and expand, or replace with more accurate information, each of their initial statements.

2. **Talking about thinking**

Talking about thinking is important because students need a thinking vocabulary. During planning and problem solving situations, teachers should think aloud so that students can follow demonstrated thinking processes. Modeling and discussion develop the vocabulary students need for thinking and talking about **Metacognition** their own thinking. Labeling thinking processes when students use them is also important for student recognition of thinking skills.

Paired problem solving is another useful strategy. One student talks through a problem, describing his / her thinking processes. His / her partner listens and asks questions to help clarify thinking. Similarly, in reciprocal teaching (Palinscar, Ogle, Jones, Carr, & Ransom, 1986), small groups of students take turns playing teacher, asking questions, clarifying and summarizing the material being studied.

3. **Exposure to problem solving strategies**

Other sources of metacognitive instruction especially with older students can be the biographies, journals, letters and other personal writings of famous experts in the field they are studying. Such exposure to the problem solving strategies of legendary thinkers can be inspirational and informative for students.

4. **Using prompts**

Using prompts such as 'What can do first?', 'What else might try?' and 'How well is strategy working? 'reminds the students to think about their thinking while they are working.

5. **Keeping a thinking journal**

Another means of developing meta-cognition is through the use of a journal or learning log. This is a diary in which students reflect upon their thinking, make note of their awareness of ambiguities and inconsistencies and comment on how students have dealt with difficulties. This journal is a diary of process.

6. Planning and self regulation

Students must assume increasing responsibility for planning and regulating their learning. It is difficult for learners to become self directed when learning is planned and monitored by someone else.

Students can be taught to make plans for learning activities including estimating time requirements, organizing materials, and scheduling procedures necessary to complete an activity. The resource center's flexibility and access to a variety of materials allow the student to do just this. Criteria for evaluation must be developed with students so that they learn to think and ask questions of themselves as they proceed through a learning activity.

7. Debriefing the thinking process

Closure activities focus student discussion on thinking processes to develop awareness of strategies that can be applied to other learning situations. A three step method is useful. First, the teacher guides students to review the activity, gathering data on thinking processes and feelings. Then, the group classifies related ideas, identifying thinking strategies used. Finally, they evaluate their success, discarding inappropriate strategies, identifying those valuable for future use, and seeking promising alternative approaches.

8. Self evaluation

Guided self evaluation experiences can be introduced through individual conferences and checklists focusing on thinking processes. Gradually self evaluation will be applied more independently. As students recognize that learning activities in different disciplines are similar, they will begin to transfer learning strategies to new situations.